

Long-term semi-regular dust formation by the WC9+B0I system WR 70

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We present infrared photometry of the WC9+B0I Wolf-Rayet binary system WR 70 (HD 137603) observed with telescopes at ESO, the SAAO and the AAT between 1983 and 2010 which shows persistent but variable circumstellar dust emission. Optical spectroscopy confirms the classification of the companion as a B0 supergiant and suggests that the Balmer lines in its spectrum suffer in-fill from wind emission. Re-examination of the reddening suggests a revised distance of 3.5-kpc. In the near-IR, the amplitude of variation increases with wavelength, with no significant variation in J (nor is there in the visible), implying that it is the amount of dust in the wind of WR 70 that is varying. Period searches show a period near 2.82-y. (1030~d.) but the variations are not strictly regular and there are other factors affecting the dust formation and repeatability of the light curves. There may be a secondary period near 5.88 yr. but there is no evidence for periods less than a year. A model of the spectral energy distribution in 1991 gives a dust formation rate of $5.9 \times 10^7 M_{\text{Sun}} \text{y}^{-1}$, around one-third of the available carbon from the WC9 wind going into the wind-collision region, estimating its size from average WC9 and B0Ia wind properties. The fraction of carbon going into dust varied between ~ 11 and 46 percent during our campaign, possibly as a consequence of the stars moving in an elliptical orbit.

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Weblink: <ftp://ftp.roe.ac.uk/pub/pmw/WR70rv.psf>

Comments: ...a system crying out for an orbit

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